

Streszczenie pracy w języku angielskim

This dissertation aims to assess the influence of building vibrations on the free-field ground motion. Due to the importance of the issues for geophysical surveys, the problem has been considered through the influence of selected buildings on the results of the testing seismic noise method - Horizontal to Vertical Spectral Ratio (HVSr), for the location of measurement points in the vicinity of buildings. This method is commonly used to study amplification of seismic waves due to geologic conditions (so-called site effects), but the scale of influence of buildings on its results has not been clearly defined yet in the literature. As the problem investigated in this paper concerns mainly conducting research in urbanised areas, the influence of buildings located in the area of the Upper Silesian Coal Basin, characterized by dense development, occurrence of induced seismicity related to hard coal mining and potential of site effects due to the characteristic geology of the area, was analysed. The 83-metre-high building of the Faculty of Natural Sciences in Sosnowiec and two lower buildings, "Assistant's Home" in Sosnowiec and a detached house in Imielin, were analysed. The possibility of the building's influence on the ground's vibration spectrum depends on the dynamic parameters of the structure (mainly the natural frequency) and the type of the ground on which it is placed. The methods based on the ratio of HVSr and HHSr (Horizontal to Horizontal Spectral Ratio) seismic spectra were used to determine the natural frequencies of the buildings under study and the effectiveness of the application of these methods in buildings was evaluated. Ambient seismic noise was used as a useful signal for both methods. Knowledge of the dominant vibration frequencies of a building is necessary to identify the influence of a building on the curve shape of the HVSr method used to assess site effects. A number of seismic noise measurements were carried out in free-field at various distances from buildings and in their basements in order to determine the resonance frequencies of the ground. The results obtained finally allowed to analyse the curves for the assessment of the influence of buildings on the shape of HVSr curves recorded for stations located in the vicinity of buildings. The obtained results confirm that in the case of tall buildings, their presence may be taken into account, which may affect the results of the HVSr method and the possibility of interpretation error. In particular, the influence of the building on the results of the method should be taken into account in an area of the GZW characterised by the occurrence of loose deposits in the surface layers. In the cases considered in the study, the influence of the highest, 83-metre-high building on ground vibrations in its surroundings was noticed.